In re Patent Application of
ANSORGE ET AL.
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Listing of the Claims:

This listing of claims replaces all prior versions and listing of claims in the application.

1-18 (canceled).

19. (new) A wideband speech encoding method comprising:

sampling the speech to obtain successive voice frames each comprising a predetermined number of samples, and each voice frame having determined parameters of a code-excited linear prediction model, the parameters comprising a long-term excitation digital word extracted from an adaptive coded directory, and an associated long-term gain, and a short-term excitation word extracted from a fixed coded directory and an associated short-term gain; and

updating the adaptive coded directory on the basis of the extracted long-term excitation word and of the extracted short-term excitation word, and comprising

adding the product of the long-term excitation digital word times the associated long-term gain with the product of the short-term excitation word times the associated short-term gain to generate a summed digital word, and

filtering the summed digital word with a low-pass filter having a cutoff frequency greater than a quarter and less than a half of a sampling frequency to obtain a filtered word, and

updating the adaptive coded directory with the filtered word.

20. (new) The method according to Claim 19, wherein the low-pass filter comprises a linear-phase finite impulse response digital filter having an order of at least 10.

21. (new) The method according to Claim 20, wherein the sampling frequency is 16 kHz, and the filter has an order of 20 having a cutoff frequency of the order of 6 kHz.

22. (new) The method according to Claim 19, further comprising:

extracting the short-term excitation word with a linear prediction digital filter; and

updating of a state of the linear prediction filter with the short-term excitation word filtered by a filter having at least a coefficient depend on the value of the long-term gain, in such a way as to lessen a contribution of the short-term excitation when the gain of the long-term excitation is greater than a predetermined threshold.

23. (new) The method according to Claim 22, wherein the predetermined threshold is 0.8.

24. (new) The method according to Claim 23, wherein the filter is of order 1 and has a transfer function equal to $B0+B1\ z^{-1}$, and a first coefficient B0 of the filter is equal to $1/(1+\beta.\min(Ga,1))$, and the second coefficient B1 of the filter

is equal to $\beta.\min(Ga,1)/(1+\beta.\min(Ga,1))$, where β is a real number of absolute value less than 1, Ga is the long-term gain and min(Ga,1) designates the minimum value between Ga and 1.

25. (new) The method according to Claim 24, further comprising:

extracting the long-term excitation word using a first perceptual weighting filter comprising a first formantic weighting filter; and

extracting the short-term excitation word using the first perceptual weighting filter cascaded with a second perceptual weighting filter comprising a second formantic weighting filter, the denominator of a transfer function of the first formantic weighting filter being equal to the numerator of a transfer function of the second formantic weighting filter.

26. (new) A method according to Claim 25 further comprising updating a state of the first and second perceptual weighting filters with the short-term excitation word filtered by the filter of order 1.

27. (new) The method according to Claim 19, further comprising:

extracting the long-term excitation word using a first perceptual weighting filter comprising a first formantic weighting filter; and

extracting the short-term excitation word using the first perceptual weighting filter cascaded with a second

perceptual weighting filter comprising a second formantic weighting filter, the denominator of a transfer function of the first formantic weighting filter being equal to the numerator of a transfer function of the second formantic weighting filter.

28. (new) A wideband speech encoding method comprising:

sampling the speech to obtain successive voice frames each comprising a predetermined number of samples, and each voice frame having parameters of a code-excited linear prediction model, the parameters comprising a long-term excitation digital word extracted from an adaptive coded directory, and an associated long-term gain, and a short-term excitation word extracted from a fixed coded directory and an associated short-term gain; and

updating the adaptive coded directory on the basis of the extracted long-term excitation word and of the extracted short-term excitation word, and comprising

adding the product of the long-term excitation digital word times the associated long-term gain with the product of the short-term excitation word times the associated short-term gain to generate a summed digital word, and

filtering the summed digital word to obtain a filtered word, and

updating the adaptive coded directory with the filtered word.

29. (new) The method according to Claim 28, wherein the summed digital word is filtered with a low-pass filter comprising a linear-phase finite impulse response digital filter having an order of at least 10.

30. (new) The method according to Claim 29, wherein the sampling frequency is 16 kHz, and the filter has an order of 20 having a cutoff frequency of the order of 6 kHz.

31. (new) The method according to Claim 28, further comprising:

extracting the short-term excitation word with a linear prediction digital filter; and

updating of a state of the linear prediction filter with the short-term excitation word filtered by a filter having at least a coefficient depend on the value of the long-term gain, in such a way as to lessen a contribution of the short-term excitation when the gain of the long-term excitation is greater than a predetermined threshold.

32. (new) The method according to Claim 31, wherein the predetermined threshold is 0.8.

33. (new) The method according to Claim 32, wherein the filter is of order 1 and has a transfer function equal to $B0+B1\ z^{-1}$, and a first coefficient B0 of the filter is equal to $1/(1+\beta.\min(Ga,1))$, and the second coefficient B1 of the filter is equal to $\beta.\min(Ga,1)/(1+\beta.\min(Ga,1))$, where β is a real

number of absolute value less than 1, Ga is the long-term gain and min(Ga,1) designates the minimum value between Ga and 1.

34. (new) The method according to Claim 33, further comprising:

extracting the long-term excitation word using a first perceptual weighting filter comprising a first formantic weighting filter; and

extracting the short-term excitation word using the first perceptual weighting filter cascaded with a second perceptual weighting filter comprising a second formantic weighting filter, the denominator of a transfer function of the first formantic weighting filter being equal to the numerator of a transfer function of the second formantic weighting filter.

35. (new) A method according to Claim 34 further comprising updating a state of the first and second perceptual weighting filters with the short-term excitation word filtered by the filter of order 1.

36. (new) The method according to Claim 28, further comprising:

extracting the long-term excitation word using a first perceptual weighting filter comprising a first formantic weighting filter; and

extracting the short-term excitation word using the first perceptual weighting filter cascaded with a second perceptual weighting filter comprising a second formantic

weighting filter, the denominator of a transfer function of the first formantic weighting filter being equal to the numerator of a transfer function of the second formantic weighting filter.

37. (new) A wideband speech encoding device comprising:

sampling means for sampling the speech to obtain successive voice frames each comprising a predetermined number of samples;

processing means for determining parameters of a code-excited linear prediction model with each voice frame, and comprising first extraction means for extracting a long-term excitation digital word from an adaptive coded directory and calculating an associated long-term gain, and second extraction means for extracting a short-term excitation word from a fixed coded directory and calculating an associated short-term gain; and

first updating means for updating the adaptive coded directory on the basis of the extracted long-term excitation word and of the extracted short-term excitation word, and comprising

first calculation means for summing the product of the long-term excitation extracted word times the associated long-term gain, with the product of the short-term excitation extracted word times the associated short-term gain, to deliver a summed digital word, and

a low-pass filter having a cutoff frequency greater than a quarter and less than a half of a sampling frequency to generate a filtered word, and connected between an output of the first calculation means and the adaptive coded directory to update the adaptive directory with the filtered word.

38. (new) The device according to Claim 37, wherein the low-pass filter comprises a linear-phase finite impulse response digital filter having an order of at least 10.

39. (new) The device according to Claim 38, wherein the sampling frequency is 16 kHz, and the linear-phase finite impulse response digital filter has an order 20 and a cutoff frequency of the order of 6 kHz.

40. (new) The device according to Claims 37 wherein the first extraction means comprises a linear prediction digital filter; and further comprising second updating means for updating of a state of the linear prediction filter with the short-term excitation word filtered by a filter having at least a coefficient dependent on the value of the long-term gain, in such a way as to lessen a contribution of the short-term excitation when the gain of the long-term excitation is greater than a predetermined threshold.

41. (new) The device according to Claim 40, wherein the predetermined threshold is 0.8.

42. (new) The device according to Claim 41, wherein the filter is of order 1 and has a transfer function equal to $B0+B1\ z^{-1}$, and a first coefficient B0 of the filter is equal to $1/(1+\beta.\min(Ga,1))$, and a second coefficient B1 of the filter is equal to $\beta.\min(Ga,1)/(1+\beta.\min(Ga,1))$, where β is a real number of absolute value less than 1, Ga is the long-term gain and min(Ga,1) designates the minimum value between Ga and 1.

43. (new) The device according to Claim 42, wherein the first extraction means comprises a first perceptual weighting filter comprising a first formantic weighting filter, the second extraction means comprises the first perceptual weighting filter cascaded with a second perceptual weighting filter comprising a second formantic weighting filter, and the denominator of a transfer function of the first formantic weighting filter is equal to the numerator of a transfer function of the second formantic weighting filter.

44. (new) The device according to Claim 43, wherein the second updating means updates a state of the two perceptual weighting filters with the short-term excitation word filtered by the filter of order 1.

45. (new) A wideband speech encoding device comprising:

a sampler to sample the speech to obtain successive voice frames each comprising a predetermined number of samples;

a processor to determine parameters of a code-excited linear prediction model with each voice frame, and comprising a first extractor to extract a long-term excitation digital word from an adaptive coded directory and calculate an associated long-term gain, and a second extractor to extract a short-term excitation word from a fixed coded directory and calculate an associated short-term gain; and

a first updating unit to update the adaptive coded directory on the basis of the extracted long-term excitation word and of the extracted short-term excitation word, and comprising

a first calculation unit to add the product of the long-term excitation extracted word times the associated long-term gain, with the product of the short-term excitation extracted word times the associated short-term gain, to deliver a summed digital word, and

a low-pass filter to generate a filtered word, and connected between an output of the first calculation unit and the adaptive coded directory to update the adaptive coded directory with the filtered word.

46. (new) The device according to Claim 45, wherein the low-pass filter comprises a linear-phase finite impulse response digital filter having an order of at least 10.

47. (new) The device according to Claim 46, wherein the sampling frequency is 16 kHz, and the linear-phase finite

impulse response digital filter has an order 20 and a cutoff frequency of the order of 6 kHz.

48. (new) The device according to Claims 45 wherein the first extraction unit comprises a linear prediction digital filter; and further comprising a second updating unit to update a state of the linear prediction filter with the short-term excitation word filtered by a filter having at least a coefficient dependent on the value of the long-term gain, in such a way as to lessen a contribution of the short-term excitation when the gain of the long-term excitation is greater than a predetermined threshold.

49. (new) The device according to Claim 48, wherein the predetermined threshold is 0.8.

50. (new) The device according to Claim 49, wherein the filter is of order 1 and has a transfer function equal to $B0+B1\ z^{-1}$, and a first coefficient B0 of the filter is equal to $1/(1+\beta.\min(Ga,1))$, and a second coefficient B1 of the filter is equal to $\beta.\min(Ga,1)/(1+\beta.\min(Ga,1))$, where β is a real number of absolute value less than 1, Ga is the long-term gain and min(Ga,1) designates the minimum value between Ga and 1.

51. (new) The device according to Claim 50, wherein the first extraction unit comprises a first perceptual weighting filter comprising a first formantic weighting filter, the second extraction unit comprises the first perceptual weighting filter cascaded with a second perceptual

weighting filter comprising a second formantic weighting filter, and the denominator of a transfer function of the first formantic weighting filter is equal to the numerator of a transfer function of the second formantic weighting filter.

52. (new) The device according to Claim 51, wherein the second updating unit updates a state of the two perceptual weighting filters with the short-term excitation word filtered by the filter of order 1.

53. (new) A terminal of a wireless communication system, comprising a device according to Claim 45.

54. (new) The terminal according to Claim 53, wherein the terminal defines a mobile telephone.